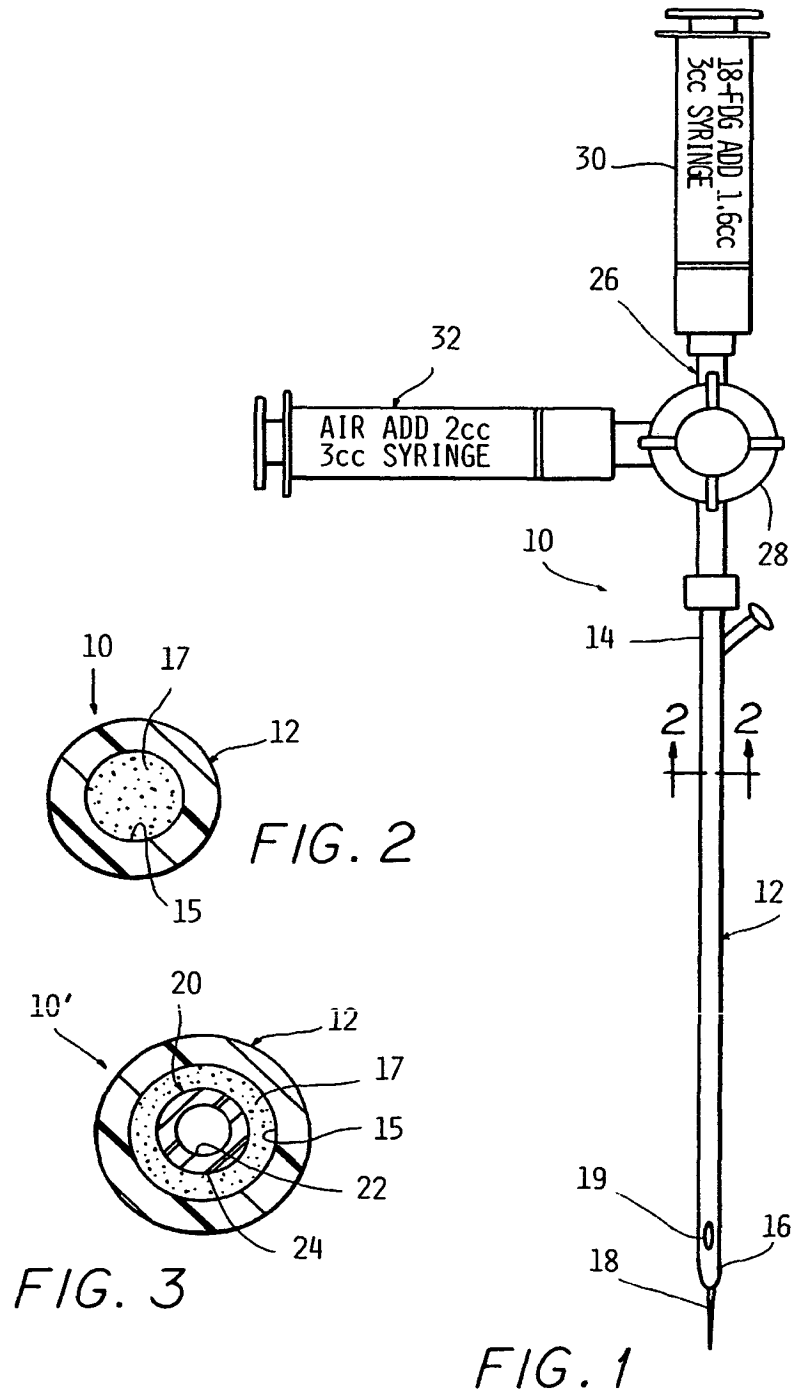
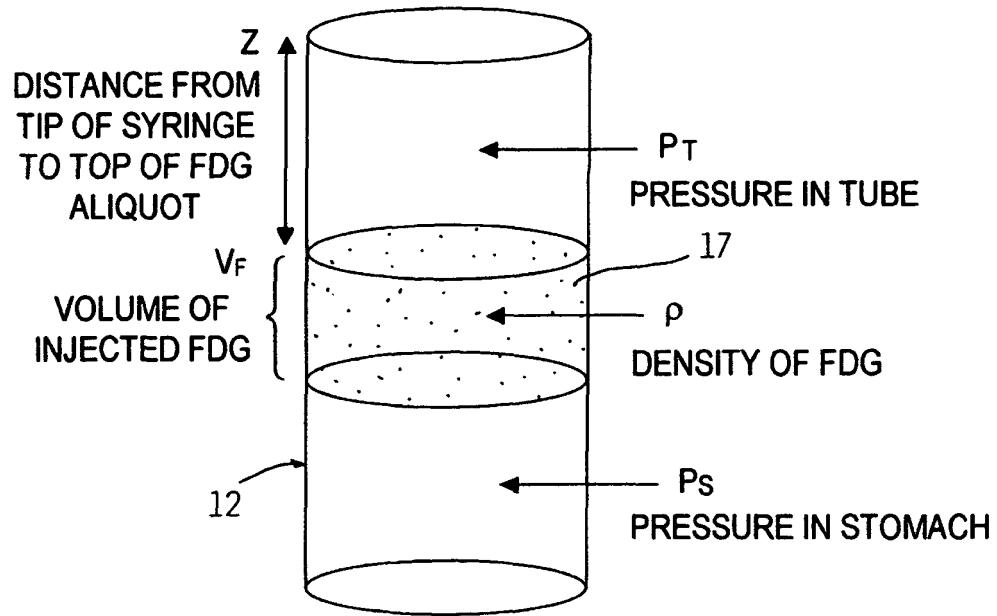


INTERNAL MARKER DEVICE FOR  
IDENTIFICATION OF BIOLOGICAL SUBSTANCES  
Cherry T. Thomas et al.  
Docket No.: UMJ107B

1/8



2/8



$V_A$  = VOLUME OF INJECTED AIR FROM SYRINGE

$g = 10 \text{ m/s}^2$

$P_A$  = AIR PRESSURE  $\sim 10^5 \text{ N/m}^2$

$\rho$  = ASSUME  $\sim 1 \text{ g/cc} \rightarrow 10^3 \text{ kg/m}^3$

IN EQUILIBRIUM, FORCES ON FDG ALIQUOT ADD TO ZERO:

$$V_F \rho g + \pi r^2 P_T = \pi r^2 P_S \quad (1)$$

**FIG. 4**

INTERNAL MARKER DEVICE FOR  
IDENTIFICATION OF BIOLOGICAL SUBSTANCES  
Cherry T. Thomas et al.  
Docket No.: UMJ107B

3/8

$$P_T \pi r^2 Z = P_A V_A \quad (\text{II a})$$

SO

$$P_T = \frac{P_A V_A}{\pi r^2 Z} \quad (\text{II b})$$

SO

$$\underbrace{V_{F\rho g}}_{\substack{\text{FORCE} \\ \text{DUE TO} \\ \text{GRAVITY} \\ (F_g)}} + \underbrace{\frac{P_A V_A}{Z}}_{\substack{\text{FORCE} \\ \text{PUSHING} \\ \text{DOWNWARD} \\ \text{ON FDG} \\ \text{DUE TO} \\ \text{PRESSURE} \\ \text{IN THE TUBE} \\ (F_T)}} = \underbrace{\pi r^2 P_s}_{\substack{\text{FORCE} \\ \text{PUSHING} \\ \text{UPWARD} \\ \text{DUE TO} \\ \text{STOMACH} \\ \text{PRESSURE} \\ (F_s)}} \quad (\text{III})$$

**FIG. 5A**

AS AIR IS INJECTED, THE ALIQUOT OF FDG MOVES DOWN  
THE TUBE AND Z IS GIVEN BY:

$$Z = \frac{P_A V_A}{\pi r^2 P_s - V_{F\rho g}} \quad (\text{IV})$$

NOW

$$\begin{aligned} V_{F\rho g} &\leq (2\text{cc})(1\text{g/cc})(10\text{m/s}^2) \\ &\leq 2 \times 10^{-2} \text{ N} \quad \text{gravitational force} \end{aligned}$$

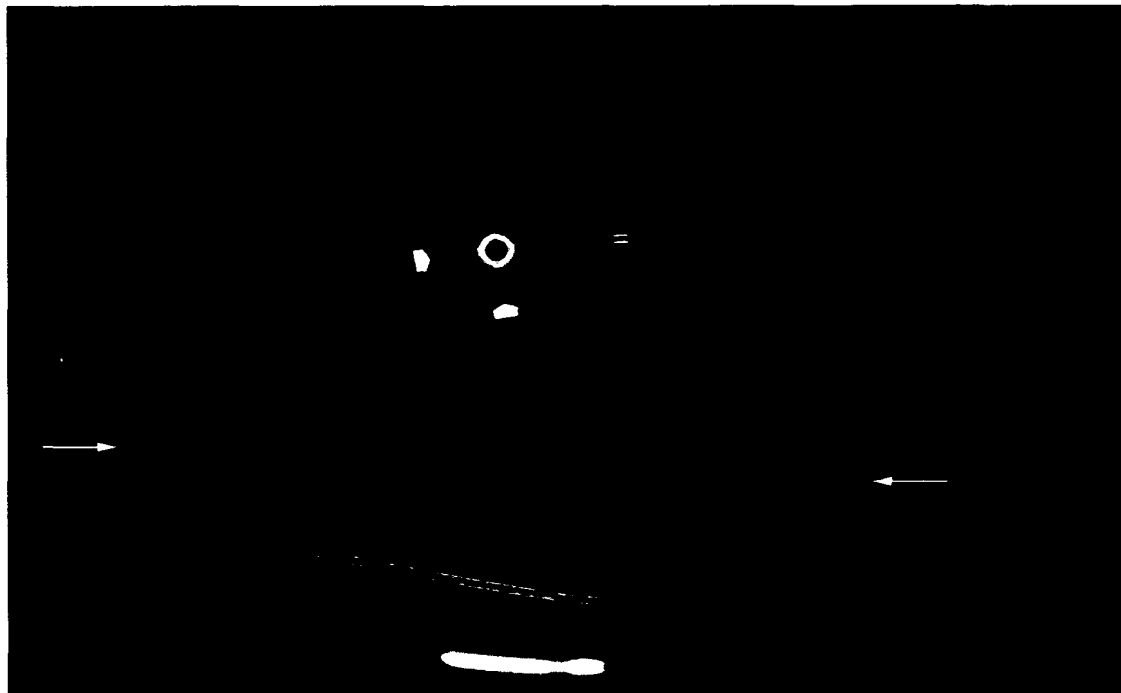
AND

$$\begin{aligned} \pi r^2 P_s &\sim (3.14)(1.27\text{mm})^2 (10^5 \text{ N/m}^2) \\ &\quad (\text{ASSUMING } P_s \sim \text{AIR PRESSURE}) \\ &\sim 5.1 \times 10^{-1} \text{ N} \quad \text{force from stomach} \end{aligned}$$

**FIG. 5B**

INTERNAL MARKER DEVICE FOR  
IDENTIFICATION OF BIOLOGICAL SUBSTANCES  
Cherry T. Thomas et al.  
Docket No.: UMJ107B

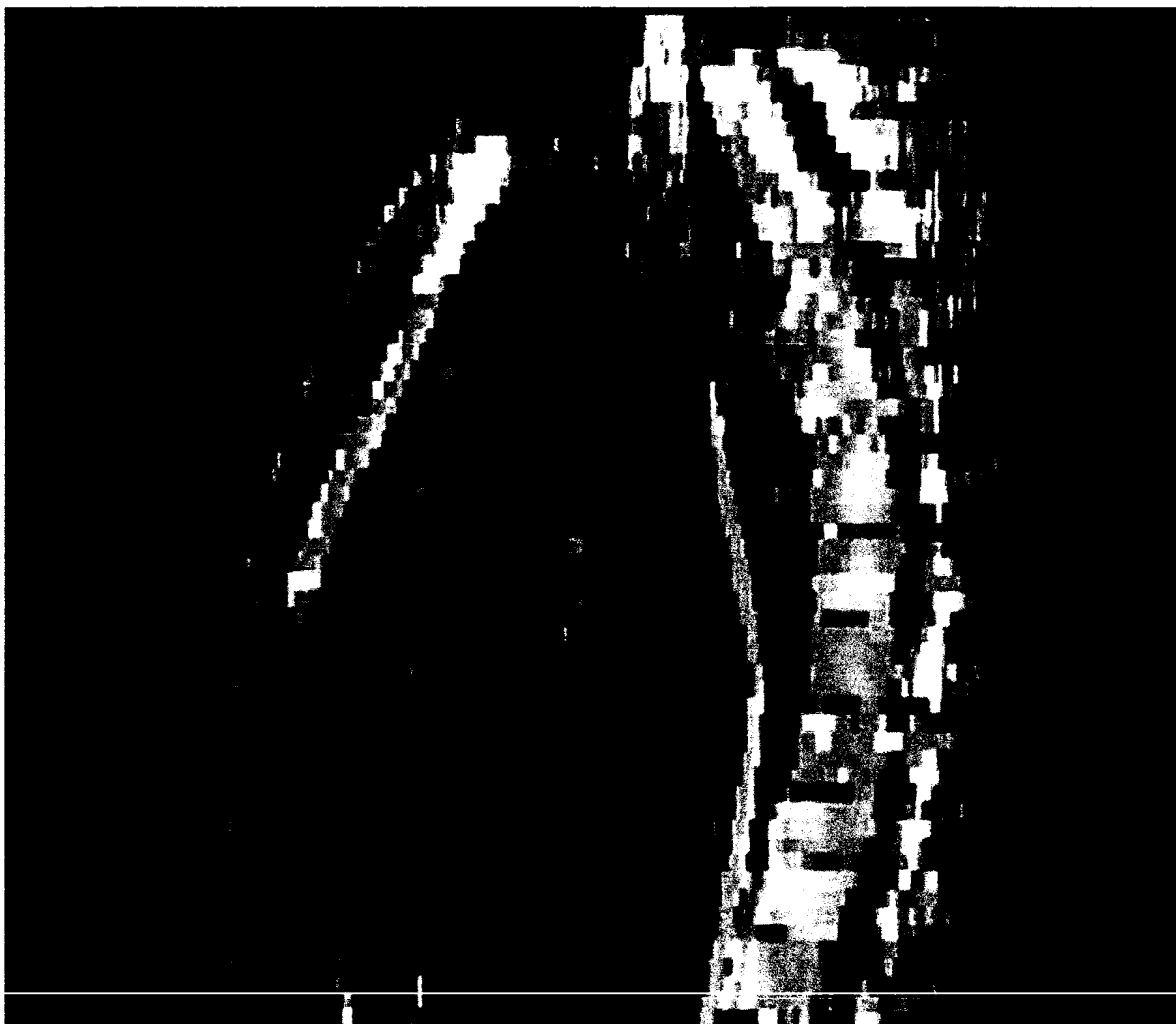
4/8



*FIG. 6*

INTERNAL MARKER DEVICE FOR  
IDENTIFICATION OF BIOLOGICAL SUBSTANCES  
Cherry T. Thomas et al.  
Docket No.: UMJ107B

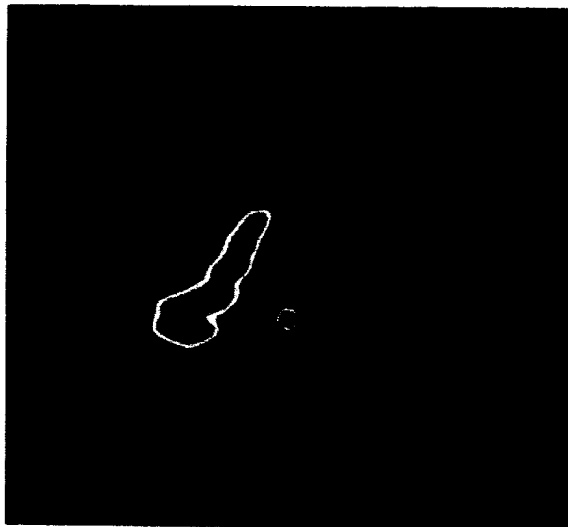
5/8



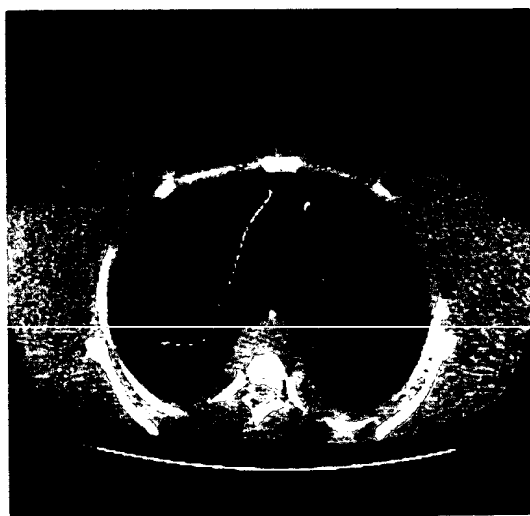
*FIG. 7*

INTERNAL MARKER DEVICE FOR  
IDENTIFICATION OF BIOLOGICAL SUBSTANCES  
Cherry T. Thomas et al.  
Docket No.: UMJ107B

6/8



*FIG. 8A*



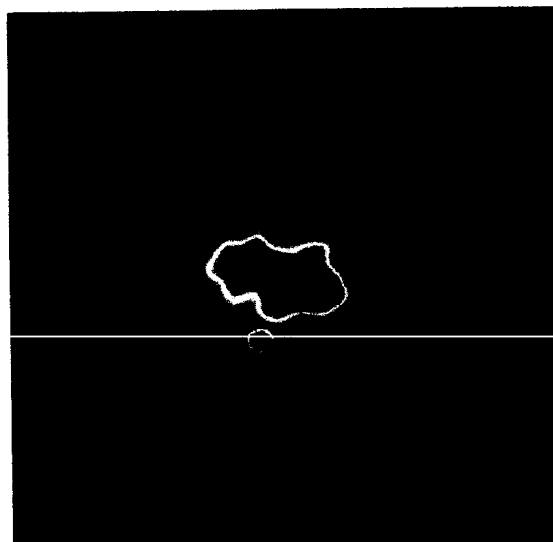
*FIG. 8B*

INTERNAL MARKER DEVICE FOR  
IDENTIFICATION OF BIOLOGICAL SUBSTANCES  
Cherry T. Thomas et al.  
Docket No.: UMJ107B

7/8



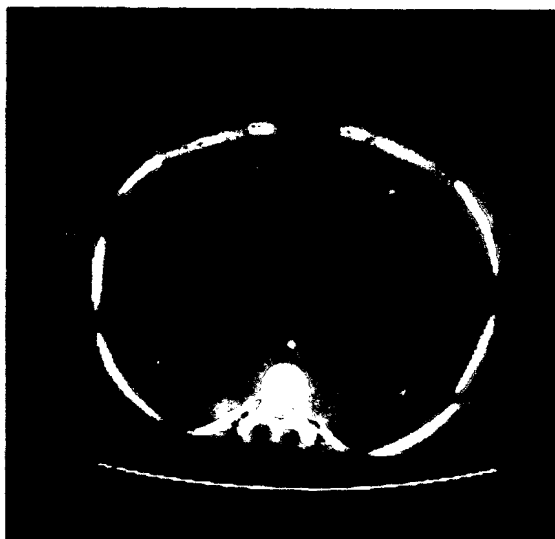
*FIG. 8C*



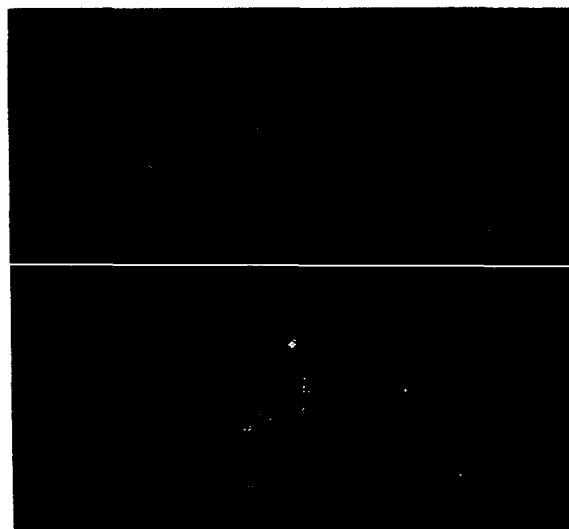
*FIG. 9A*

INTERNAL MARKER DEVICE FOR  
IDENTIFICATION OF BIOLOGICAL SUBSTANCES  
Cherry T. Thomas et al.  
Docket No.: UMJ107B

8/8



*FIG. 9B*



*FIG. 9C*